ERIC Document Resume	See Instruction Sheet	DATE OF RESUME	DATE RECEIVED

A. PUBLICATION DATA

1. ED NUMBER	2. ORIGINATOR CONTROL NO(S).	3. IDENTIFICATION NO.
ED001331	SC 2376	N.A.

DO NOT WRITE IN SPACE BELOW

4. AUTHOR(S):
McPherson High School

5. TITLE OF DOCUMENT ABSTRACTED:
School Air Conditioning/Case Study - McPherson High School, McPherson, Kansas

6. PUBLICATION TITLE:
N.A.

7. EDITOR(S):
N.A.

8. PLACE OF ORIGIN
McPherson High School,
ORG.
McPherson, Kansas
ST.
CITY, STATE

9. PUBLISHER OR SOURCE
McPherson High School
McPherson, Kansas

TELE. EXT.
INST/LOC CODE

10. VOL.	11. PAGES	12. MO./YR.	13. TOTAL PP.
N.A.	N.A.	N.A.	12

MICROFILM COPY AVAILABLE
YES ☒ NO ☐

COPYRIGHT GRANTED
YES ☐ NO ☒

COPYRIGHT RELEASE FILED
YES ☐ NO ☐

TYPE OF REPORT
PROPOSAL ☐
IN-PROGRESS ☐
FINAL ☒
FOLLOW-UP ☐

OTHER ERIC REFERENCES:

ERIC SATELLITE CODE

B. INDEXING DATA

14. SUBJECT AREA

15. TYPE OF ENDEAVOR
report

16. INDEXING TERMS (6-12)

school economy	cost data	school construction		
controlled environments	architectural design			McPherson,
building designs	educational demands	air conditioning		Kansas
teamwork	flexibility	new facilities		

17. ABSTRACT (MAX. 250 WORDS)

The Stanford University School Planning Laboratories conducted an educational survey of the educational needs of the McPherson City Schools by studying the existing conditions, local economies, and potential population growth. It was recommended that a new senior high be built to house 700-750 students, the anticipated enrollment ten years after completion. Educational specifications were based upon an ungraded high school, incorporating team teaching, language laboratory, educational television and the use of movable partitions to permit varying student-teacher ratios. It was decided that controlled environments would offer extra benefits from the standpoint of pupils, teachers and the learning process as well as in maintenance and administration. A breakdown of the prices relating to heating, ventilating and air conditioning systems revealed that the controlled environment could be installed at a reasonable cost. In the matter of design, the shape that seemed to function best with the educational program was the hexagon, which would permit a group of classrooms to be focused around a central instruction core, while at the same time permiting flexibility of instructional space.

It is held that this building proves that with intelligent counsel, planning, and cooperation, it is possible to meet the new educational demands for a flexible, functional building with a completely controlled thermal environment at a high degree of quality and comparatively low cost. Some unusual facts about the building are that exterior windows in the academic area are reduced to vision strips and that the irregular shapes of the classrooms aid acoustical qualities. Tables are included showing cost data and the architect's analysis of savings.

ERIC No.

18. SOURCE OF ABSTRACT

C. FUNDING DATA

19. SUPPORTING ORGANIZATION	20. DIVISION OR DEPT.	21. CONTRACT NO. / PROJECT NO.
	22. TOTAL COST OF PROJECT	
	23. DURATION OF PROJECT	U.S. Department of Health, Education, and Welfare Office of Education

ERIC Form 1

REPRINTED BY PERMISSION
U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
OFFICE OF EDUCATION

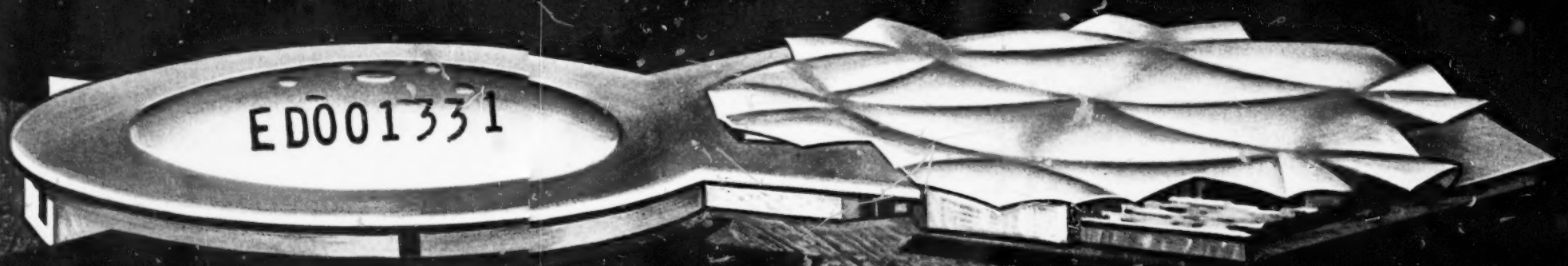
THIS DOCUMENT HAS BEEN PRINTED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

2376

SCHOOL AIR CONDITIONING / CASE STUDY

McPherson High School

McPherson, Kansas



ED001331

McPherson, Kansas, Builds a New High School

As told by Joe W. Ostenberg, Superintendent of Schools

Three of the advisors from Stanford's School Planning Laboratory:
Donald L. Davis, Educational Consultant
James D. MacConnell, Director
John Reed Call, Project Assistant

Imaginative planning and grass-roots cooperation in America's heartland creates a prototype for schools of the future

In the spring of 1959 Stanford University School Planning Laboratories was contacted to make an overall educational survey of the educational needs for the McPherson City Schools. The Stanford staff studied the existing conditions, including buildings, locations, etc. They studied the economies of the McPherson community and the potential population growth.

On the advice of Dr. William Odell of Stanford University, a Citizens Advisory Committee (25 in number) was appointed by the Board of Education to help appraise the Stanford survey and to assist the Board in presenting the facts to the public before any bond election which might be recommended. After hearing and receiving the preliminary survey report presented by Dr. Odell and Don Davis early in December, 1959, the Committee met for a three-hour session each week for twelve weeks. Sub-committees worked on specific preliminary recommendations, gathering data from the school staff and others. When Dr. Odell returned for the final report in early February, 1960, the Committee was unanimous in its opinion that this plan was the best that could be developed under the existing conditions.

The survey recommended the building of a new Senior High School; moving the present Junior High School to the present Senior High School building; moving the Wickersham Grade School to the present Junior High School and abandoning the Wickersham building. It also called for additions to three other grade school buildings.

The survey recommended that the Board proceed at once to call for a special election to vote bonds for the new Senior High School to house 700-750 students, the anticipated enrollment ten years after completion.

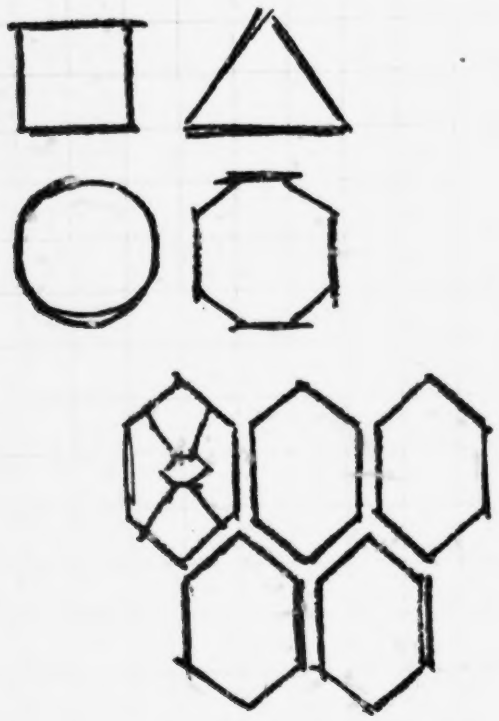
The members of the Citizens Advisory Committee represented a cross-section of the cultural, social, and economic elements of the community. Each of them helped to carry the message of the bond election to their respective groups. The Administration and the Board of Education were inconspicuous. The members of the Committee were principally instrumental to the success of the bond election.

The Board of Education did not have any design of the anticipated building to present during the bond campaign. This approach was unique, at least in our section of the country. In place of a proposed design, all published materials made the promise that the new building would be planned with the assistance and direction of Stanford University's staff and that we would continue to have citizens' groups to assist in the developing of all phases of the building project.

In May, after the bond election had carried—by approximately a two-to-one vote—the Board of Education appointed committees to work with the Administration and Stanford University in developing the Educational Specifications for the new High School.

Early in June Don Davis from Stanford University began developing the Educational Specifications. The Board appointed citizens' groups with background training and experience in specific fields to work with the staff in those fields or departments. These groups served three purposes: (1) they assisted in appraising our present and future educational programs; (2) they helped to appraise the amount of space needed for the same; (3) they served as a "sounding board" for design ideas for the new building.

"Do we dare think in terms of an air-conditioned school?"



The Board of Education also appointed a Central Committee of eight representative citizens to advise with them on the overall problems involved in the new High School project.

In June, 1960, this committee met with the Board of Education, Architect John Shaver of Salina, Kansas, Don Davis of Stanford University, and the administrative staff members involved in the Senior High School. At this meeting a variety of fundamental questions were discussed, such as the number of students to be cared for in the first increment of the building; why the Board thought not to include an auditorium in the first increment; etc. The question which proved to have the most far-reaching significance was, "If we can construct a building with a completely controlled environment at virtually no increase in cost—and fully as functional as a conventional building—should the Board give such a design serious consideration?" In other words, "Should we include air conditioning or cooling rather than the usual controls found in most schools?"

The Central Committee was unanimous in the opinion that—in view of the recognition of the need for a controlled environment in homes and in the commercial world—the Board would be extremely foolish not to give serious consideration to such a structural plan. They said, "We're building for the future—25 to 50 years—and not for tomorrow alone."

The Board was in wholehearted agreement with the committee on this point, but they had apprehensions as did the Superintendent: "Do we *dare* think in terms of an air-conditioned school?"

These opinions gave the architect, the Stanford University consultants, and the Administration direct guidance with regard to the types of design to be explored. Considering the available funds, it was clear that some type of compact design would have to be used.

Thus it was that last year, at the Annual School Building Institute at Stanford University, John Shaver, members of the Stanford University team and I began investigating economical, compact designs which might also be functional. One morning, at breakfast, Mr. Shaver roughly sketched out a design for our consideration using a cluster of hexagons. As we began studying this design, it appeared to have the potential of being economical, functional, and flexible.

After returning to sunny Kansas from cool California, the concept of a round gymnasium began to grow. We had scanty information about the experiment at Bethesda, Maryland. It was our understanding that the Educational Facilities Laboratories, Inc., had granted the Board of Education there enough funds to pay for a second set of architectural plans for their anticipated gymnasium, and that when the contracts had been let the round gymnasium plans could be built for some $6,000 cheaper than the rectangular plan, even though the round plan gave some additional usable floor space. We also checked the experience of Wichita University, located some fifty miles south of McPherson. We found that they had built a round Field House, after failing to let the contract for a rectangular one because of inadequate funds.

With this background, Mr. Shaver drew up as a part of the rough plan a combination of a cluster of hexagons for the academic area, combined with a round field house, or gymnasium. At the September meeting of the Citizens Central Committee, the Board of Education, Stanford University consultants, and the Administration, the architect presented rough plans for three basically different designs:

1. A conventional design, with much window space, and anything but compact.

2. A compact, rectangular-shaped building with few outside windows, and many inside classrooms.

3. A design with a hexagonal academic area and a round gymnasium, with the shops housed in a separate rectangular building at the rear of the gymnasium.

After the presentation of the different designs by Mr. Shaver, Dr. MacConnell suggested that by building the shops around the arena of the gym, we would virtually eliminate the construction of one wall, as the gymnasium wall would already be there.

At its September meeting, the Board of Education approved the suggestion of the Central Committee and the Stanford consultants; namely, the cluster of hexagons for the academic area and the round gymnasium with classrooms, shops, dressing rooms, etc., surrounding the gym. The architect was instructed to proceed to develop the details of this plan.

Another basic factor in the development of this building design is the amount of participation of the staff and other interested people in working out details of the various departments and classroom areas. The classroom teachers have played a major role in planning the type of design and the equipment to be installed in the building. The State Department of Vocational Education Homemaking Division checked the design. A citizens' group was used in varying degree.

Certainly, with this type of planning, it required a greater amount of time for the architect to complete the specifications and blueprints. However, in my experience, no architect has been willing to give the time as freely as have Mr. Shaver and his staff.

Now what are the facts with regard to this building?

1. It will require approximately 18 months to complete. Therefore, it should be finished around Christmas, 1962.

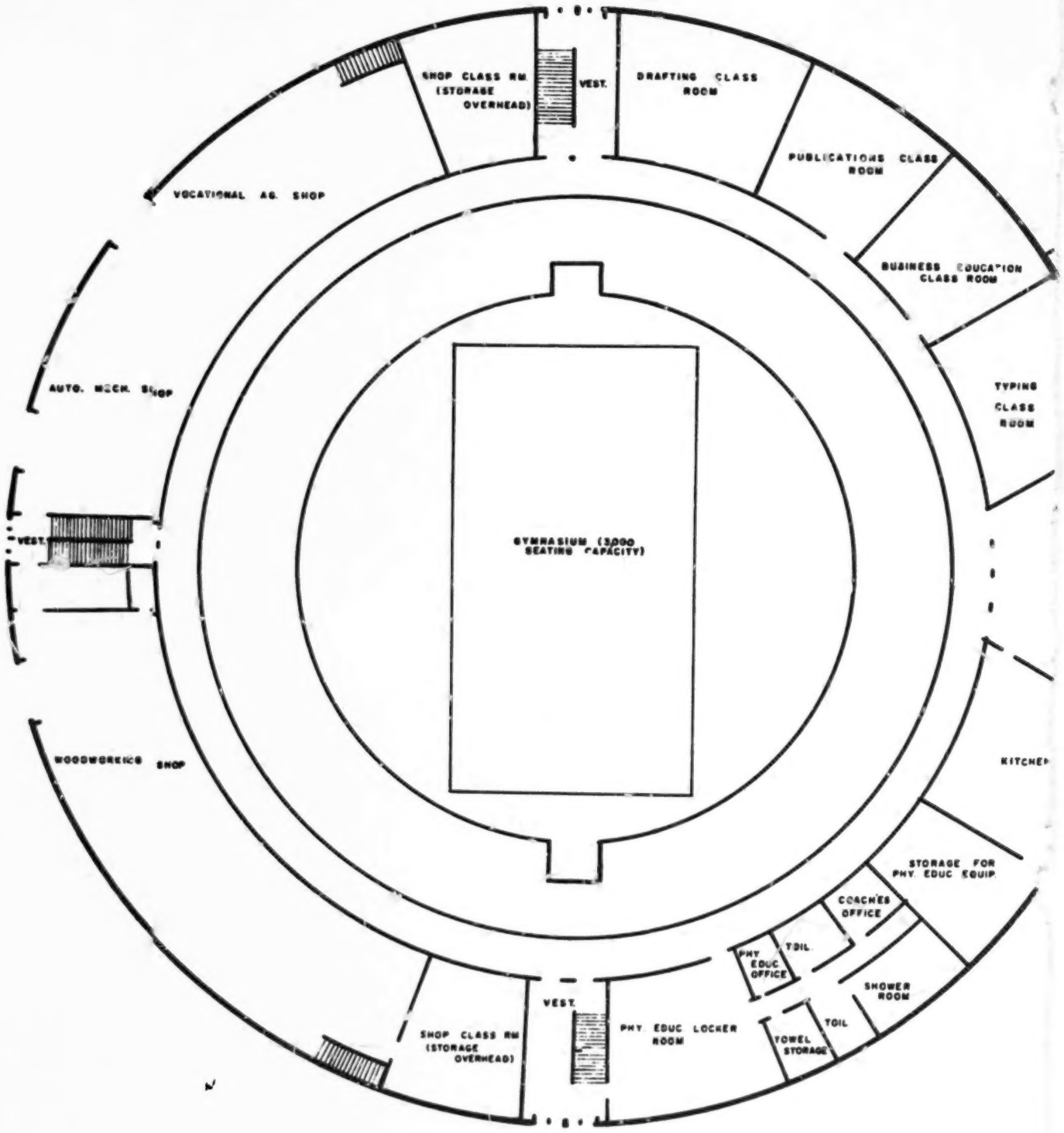
2. The gross area of the structure will be somewhat less than 115,000 square feet.

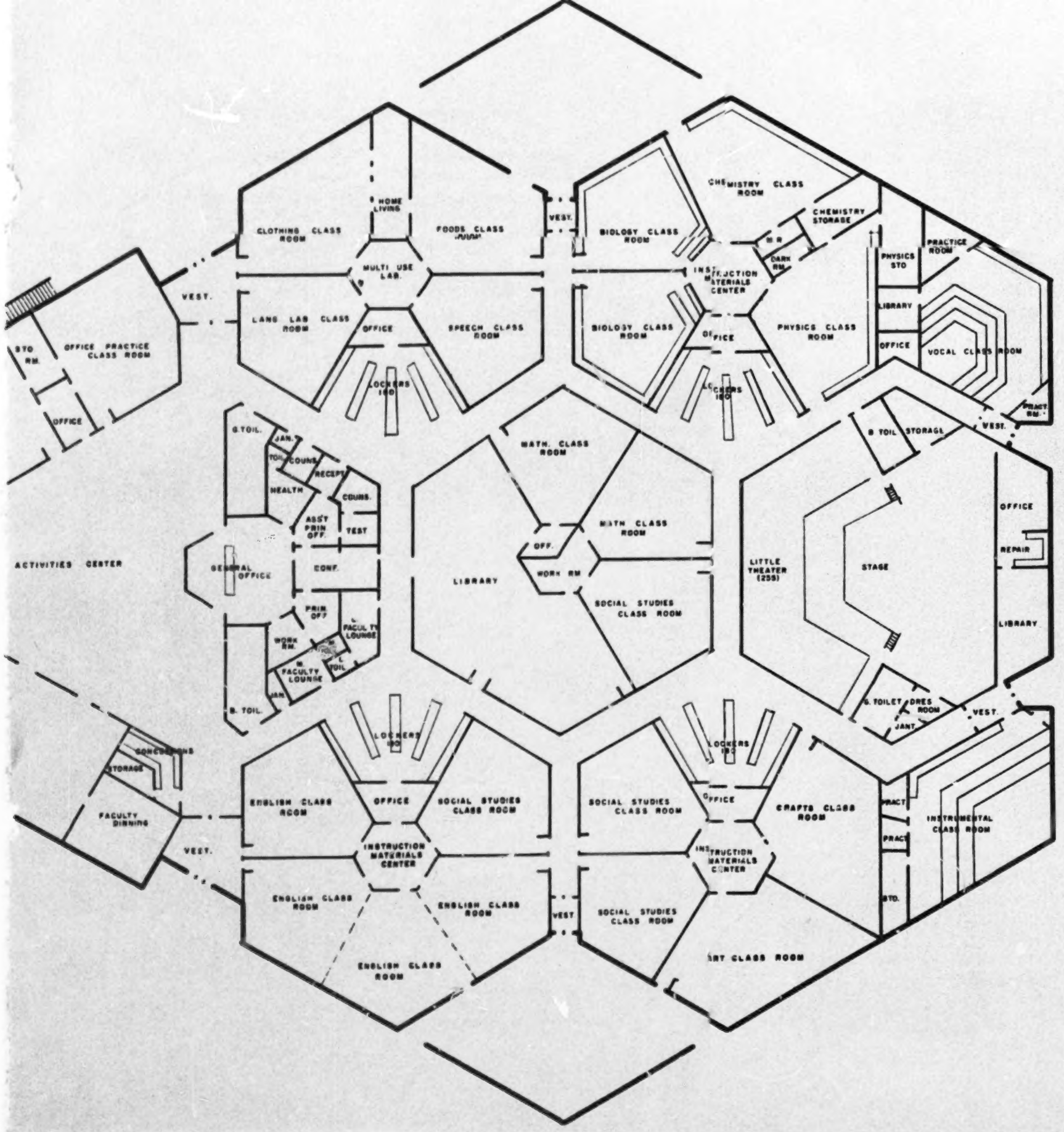
3. The gymnasium will have telescopic bleachers which, along with temporary seats, will accommodate approximately 4,000.

4. The gymnasium is 155 feet in diameter; when the bleachers are closed, we will have a usable diameter of 145 feet.

5. The gymnasium will have two complete basketball courts in one direction, 94 feet in length. The playing court will criss-cross the two practice courts.

6. The gymnasium can be divided for two large physical education classes. At the same time, various games such as badminton, ping-pong, etc., can be in operation. This area will have three large dressing rooms.





7. It is anticipated that the gym floor and the dressing room facilities will be adequate for any expansion which may take place in the future, up to approximately 1400 students.

8. The academic area, including the cluster of hexagons and the classrooms along the gymnasium's east wall will have complete environmental control. This includes heating, ventilating, lighting and air conditioning.

9. The air conditioning system has a switch-over which will permit the cooling of the gymnasium arena when the major portion of the classroom area is not in use.

10. The administrative offices will have both heating and cooling by a separate unit. This is particularly planned to care for the cooling of the offices when the remainder of the building may not be in use.

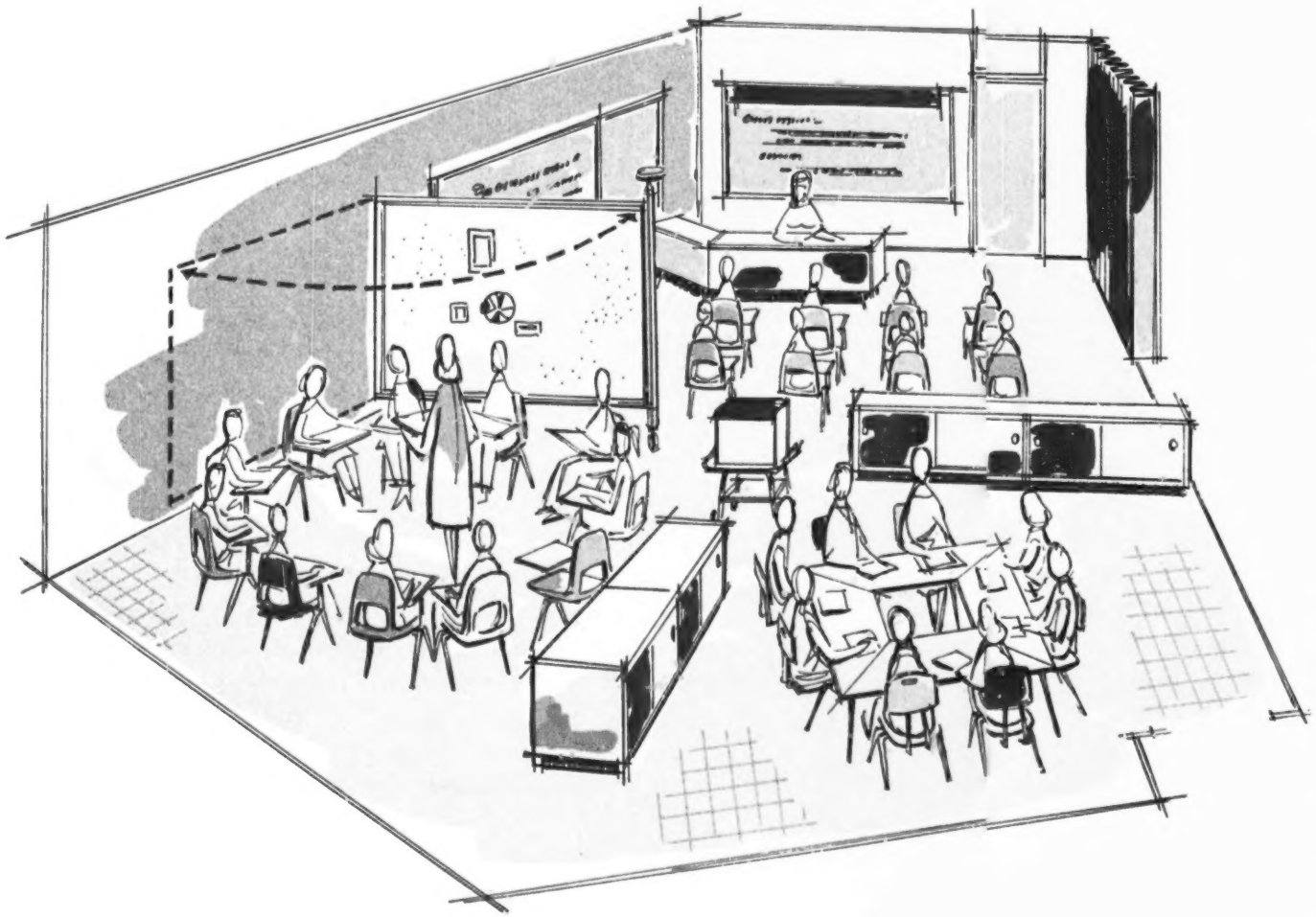
11. The space connecting the classroom area with the gymnasium will be a multi-purpose room; it will serve as study hall, cafeteria, and as a concourse when activities are held in the gymnasium.

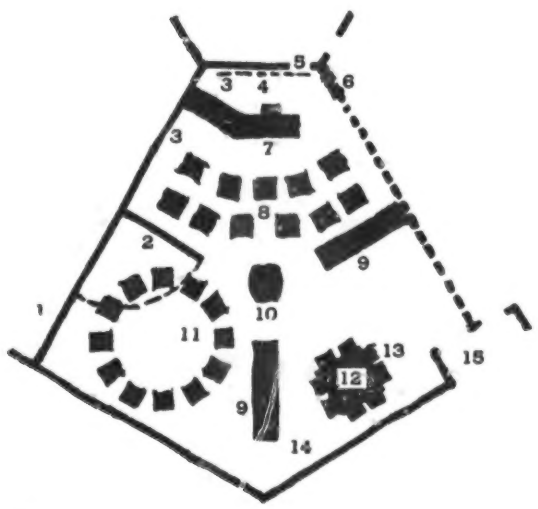
12. The library will be located in the center hexagon of the academic area. At first it will occupy only one-half of the hexagon. The educational specifications call for making this entire hexagon into a library area if and when the building is expanded.

13. The instrumental and vocal music rooms are located in the extreme south end of the building. They are separated by the Little Theater.

14. There are six major exits from the academic area, plus four supplemental exits.

15. The Cafeteria Kitchen is equipped to meet any foreseeable expansion in school enrollment. It will also serve as a Central Kitchen for the Junior High School.





New Spaces for Learning

1. Lightweight concrete block partition
2. Folding space divider, lined with cork
3. Chalkboards
4. Rolling projection screen
5. Entrance to Instruction Materials Center
6. Acoustical operable wall (folding door type)
7. Teacher's desk
8. Fiberglass tablet-arm chair-desks
9. General storage cabinets and bookshelves
10. Projector
11. Fiberglass tablet-arm chairs
12. Trapezoidal tables
13. Fiberglass stacking chairs
14. Vinyl asbestos tile flooring
15. Entrance to classroom from corridor

Some unusual facts about this building:

1. Exterior windows in the academic area are reduced to vision strips.

2. At the center of each hexagon is a small hexagon 20 feet in diameter. This area will serve as the instructional materials center for the particular department housed in each hexagon. It will also serve as a Small Group Instruction Center.

3. In each hexagon is an office which has adequate work space for each staff member housed in the particular hexagon.

4. There is no supporting wall in any of the hexagons. Thus, changes in room design can be made without major costs.

5. The plans call for movable walls in some of the hexagons, thus adding flexibility. These areas, plus the Little Theater, will make possible Team Teaching and Large Group Instruction.

6. The irregular shapes of the classrooms will aid the acoustical qualities.

7. Each of the classrooms and the small hexagon storage areas are a "natural" for visual education of all types. The acoustically-treated shell concrete ceiling in each classroom will give the needed height for overhead projection.

8. The academic area is planned so that the coordination of the educational program can, and will, be improved if and when additions are made to the building.

9. The building will be planned for television. However, it will not be installed at this time.

10. One of the striking features of this building is its overall flexibility. The plan for movable walls, the non-supporting walls in the hexagons, the ease with which additional hexagons can be added, the Moduwall chalk, tack, and peg boards, and the multi-purpose use of some areas, lead us to believe that this building will be able to meet the educational changes which may come during its lifetime.

11. The economy of this building is certainly one of its unusual features. Included in the economies are:

(a) The construction cost, including some $200,000 worth of equipment, will approximate $12.00 per square foot.

(b) There should be some economy in daily maintenance, due to the lack of wall openings.

(c) There should be a large saving in overall maintenance, as there will be very few window frames or other openings to paint, clean, etc.

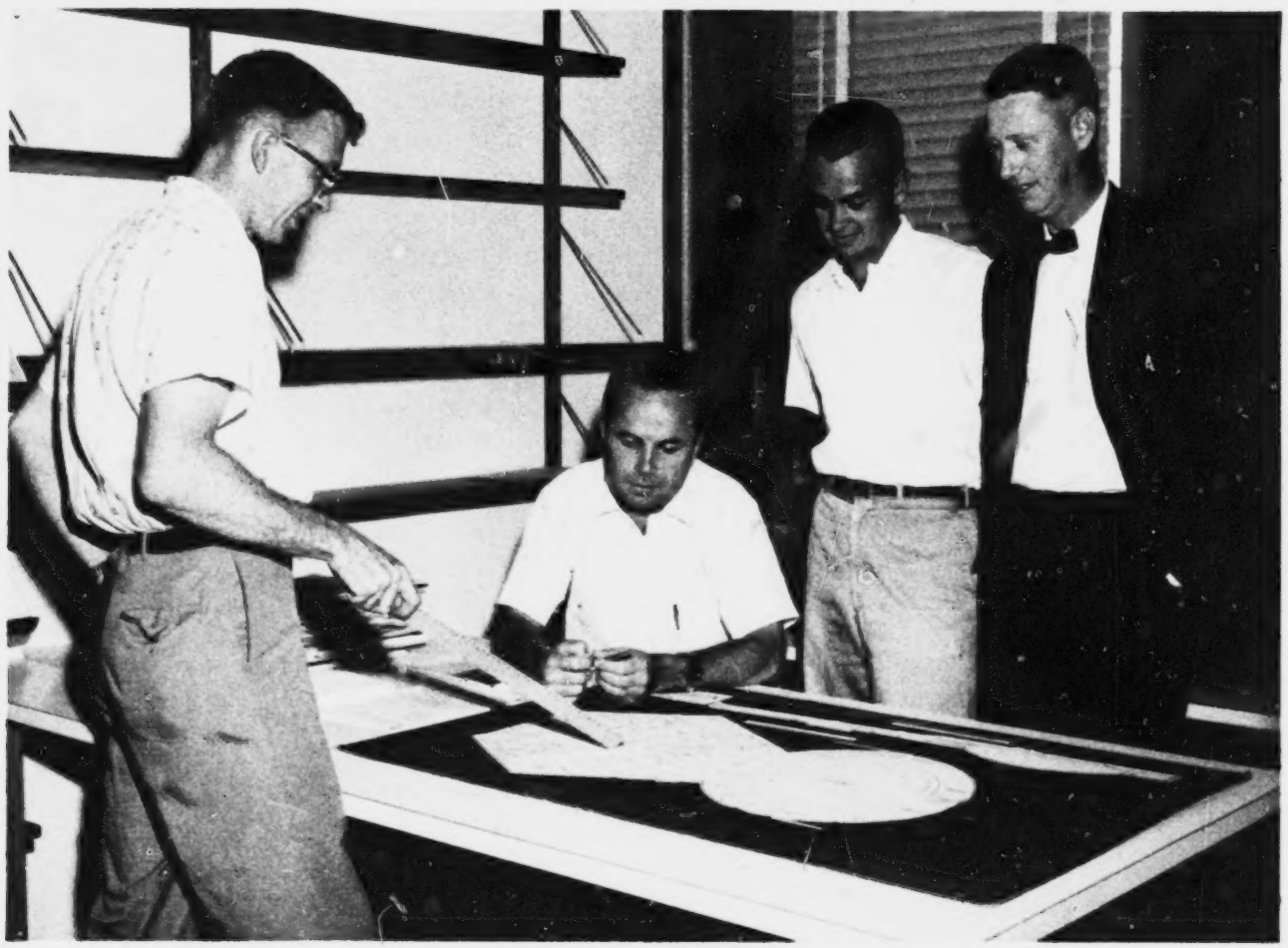
(d) The economy in construction is, in part, a result of the compactness of both the academic and the gymnasium-shop areas. This means a saving of approximately 20% of the wall space found in the most economical conventional building. The small number of openings in the building should result in savings in both heating and cooling.

How the Architectural Design Was Developed

As told by John A. Shaver, Architect

Shaver & Co., Salina, Kansas

Principals of Shaver & Co. who participated in the design (left to right): Robert McKay, partner; John A. Shaver, senior partner; Gene Hinde, firm associate; James Cleary, firm mechanical designer.



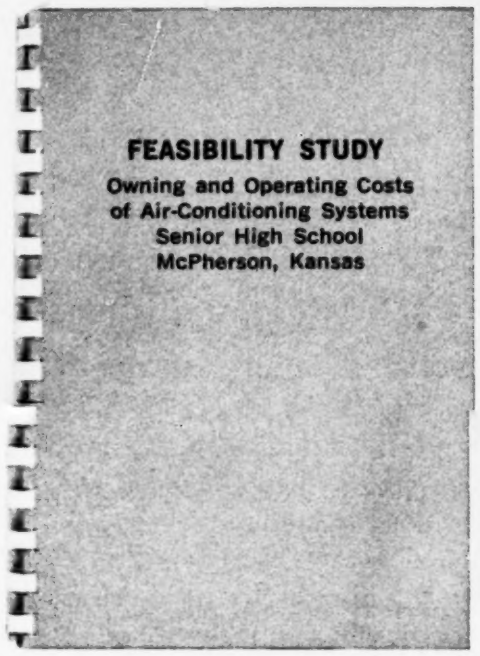
● We used the educational specifications furnished by the School Planning Laboratory of Stanford University as our overall guide in the McPherson project. These specifications were based upon an ungraded high school which would incorporate team teaching, a language laboratory, educational television, and the use of several movable partitions between classrooms to permit various ratios of students to teacher.

We started by considering both conventional and compact designs. The preliminary drawings indicated that a building with large interior areas would best suit the educational requirements and lend itself to an efficient and flexible program. But we knew that interior spaces tend to overheat and cannot be properly relieved by the conventional heating and ventilating system during a significant portion of a nine-month school term. This prompted the consideration of air conditioning for the new school. Air conditioning offered extra benefits from the standpoints of pupils and teachers and the learning process, as well as maintenance and administration. The school board readily accepted our recommendation to employ a compact design with year-round air conditioning.

In designing for the "controlled environment" school, we had studied the possibility of clustered geometric patterns. We investigated the octagon, the triangle, the square, and the circle for the academic area; but the shape that seemed to function best with the educational program was the hexagon. This shape permitted a group of classrooms or learning spaces to be focused around a central instructional core, with access to the materials center from each area. It also permitted the flexibility of divisible spaces for large and small group instruction. The hexagons clustered well and offered the utmost in compactness.

After determining the relationship of spaces and the cluster of hexagons that would best fit the function of the academic area, we studied the roof structure to enclose the space. We ended up with a thin-shell concrete design utilizing tapered conoidal forms.

One reason for the economy ...cooperation from industrial and educational people



The thin-shell roof design enabled us to use a minimum of columns and to open up large spaces within the building. It also gave greater height in parts of the instructional areas—which is needed for overhead projection and proper interior proportions.

A factor that favorably influenced cost was the simplicity of design. We were able to use repetitive structural elements throughout the building without losing flexibility in the use of the interior spaces.

The circular shape of the gymnasium worked out well. It provides a better seating arrangement for activity programs, basketball, and other spectator sports. The domed gymnasium area was encircled by spaces for lockers, showers, shops, and other noise-producing activities. Thus, the more audible programs of the school are well segregated from the quieter academic section.

One reason that this project worked out to be so economical was that we enjoyed such excellent cooperation from industrial and educational specialists. We were fortunate, for instance, in having engineers of John J. Nesbitt, Inc., people from Minneapolis-Honeywell, and representatives of American Seating Company and Brunswick in many of our planning sessions. This may not be considered the conventional way of planning, but we feel that it is very important, first, to work with the educators in finding out the nature of the educational program (as with the planning group from Stanford University); second, to develop an architectural design that would best fit the educational specifications; and third, to orient people in industry to the nature of the design and to receive their suggestions as to materials and equipment that would best accomplish the purposes of the design.

A good illustration of the extensive research involved in such a project is to be found in that relating to the air conditioning. Our engineers, with some valuable assistance from the Nesbitt people, prepared an exhaustive Feasibility Study which explored the owning and operating costs of five separate methods of air conditioning. The first of these systems used year-round heating, ventilating and air-conditioning units in classroom, instrumental rooms, library, corridor locker areas, and faculty dining room; large-volume air conditioners in the Little Theater, arena, and activity center; cabinet air conditioners in miscellaneous spaces; and a package unit in the office area; with only heating and ventilating equipment in the shops, shower rooms, and kitchen. Refrigeration equipment consisted of a centrifugal machine with a cooling tower. An electric boiler was proposed for the heating duty. Refrigerating capacity was figured for the academic area and provision was made to transfer the chilled water from the classroom wing to the arena when cooling should be required in that area.

The second system was essentially the same as the first, excepting that a gas boiler was proposed instead of an electric boiler.

In the third system, the centrifugal machine was used as a water-source heat pump and the cooling tower was eliminated. A standby electric boiler was included to size the refrigeration machine for the summer load.

System four used an air-source heat pump. A two-stage reciprocating package chiller was proposed, using an air-cooled condenser for summer duty — which reversed its cycle to become an evaporator and take heat from the outdoor air for winter heating.

The fifth system employed self-contained package air-conditioning units in all academic areas, with electric resistance heaters within the units for winter heating; and electric resistance heating equipment in the shops, kitchen, locker areas, and arena. (This system made no attempt to air-condition the arena.)

The results of the study indicated that the well water heat pump and the gas boiler with separate chiller were the systems which offered the best advantages. A test well revealed, however, that not enough water was available to satisfy the heat pump demands, so a city water scheme was substituted. The city water-heat pump (system three, modified) was used for the base bid; and the gas boiler, separate chiller (system two) was used as an alternate.

Surveying model of new high school (l. to r.): John A. Shaver, architect; Ted R. Washburn, assistant superintendent, McPherson schools; John Reed Call, project assistant, School Planning Laboratory; James D. MacConnell, director, SPL; Donald L. Davis, educational consultant, SPL; Joe W. Ostenberg, superintendent, McPherson schools.

Model of Teamwork

"The new high school now under construction in McPherson is a tribute to teamwork, cooperation, courage and creativity on the part of many who are concerned with the future quality of education."

JAMES D. MACCONNELL
Director, School Planning Laboratory, Stanford University, and Educational Facilities Laboratories, Inc. Western Regional Center

"The architect needs to take an entirely fresh approach to every school design"

—JOHN A. SHAVER

When the bids were secured, on May 10, 1961, the alternate plan (system two; gas boiler and separate chiller) offered a deduction over the base bid (city water-heat pump) and therefore was selected as the most economical system. A breakdown of the prices relating to the heating, ventilating and air conditioning system revealed that it would be installed complete at the average cost of $1.60 per square foot of building.

The total contract price of the McPherson School including Nesbitt air conditioning averaged $11.79 per square foot. (The contracts also included school furniture and kitchen equipment accounting for about $1.77 of the above square foot cost.)

The economy of McPherson, an air-conditioned school, is accentuated by the fact that the last 22 conventional junior and senior high schools built in this area had cost, with heating and ventilating alone, an average of $13.90 per square foot.

McPherson proves that with intelligent counsel, planning, and cooperation it is possible to meet the new educational demands for a flexible, functional building with a completely controlled thermal environment — with a high degree of quality and a comparatively low cost.

The project also emphasizes that the architect needs to be free of any preconceived notions, and to take an entirely fresh approach to every school design.

Cost Data:

McPHERSON SENIOR HIGH SCHOOL—McPherson, Kansas

Bids Received: May 10, 1961

Architects and Engineers: Shaver & Company, 205½ South Santa Fe, Salina, Kansas

CAPACITY: Academic areas built to accommodate 750 students
All other areas, 1250 students

BUILDING CONTAINS:

- 20 Standard Classrooms
- 4 Science Rooms
- 2 Music & Choral Rooms
- 4 Shops
- 3 Homemaking Rooms
- 1 Audio-Visual Room
- 2 Art Rooms
- 1 Library (capacity 150)
- 1 Auditorium (capacity 380)
- 3 Faculty Rooms
- 1 Cafeteria (capacity 450)
- 1 Gymnasium (capacity 3,300)
- 5 Conference Rooms
- 3 Locker Rooms
- 3 Shower Rooms
- 1 Kitchen
- 1 Administrative Suite (12 offices and work spaces)
- 8 Toilet Rooms
- 3 Storage Rooms
- 1 Student Activity Room

BUILDING CONSTRUCTION:

Floor Construction — Slab on grade; Vinyl Asbestos & Ceramic Mosaic Tile—Maple in Gymnasium.

Wall Construction — Exterior: Brick with LWC Block Backing—2" Styrofoam Insulating Core.

Interior: Plaster, Brick, LWC Blocks & Ceramic Glazed Tile.

Structural System — Reinforced Concrete.

Roof Construction — Reinforced Concrete on Concrete Columns (Thin Shell using Intersecting Conoids).

Ceiling Finishes — Acoustical Plaster & Acoustical Tile.

Windows — Aluminum.

Lighting — Fluorescent.

Heating & Air Conditioning System — Nesbitt Year-Round Syncretizers in all classrooms, music and instrumental rooms, library, corridor locker areas and faculty dining room.

Nesbitt AudiCons used for the Little Theater.

Nesbitt Series "M" Air Conditioning—Air Handling units used for arena and activity center.

A self contained package unit selected for the office area.

Nesbitt Roommates used for other miscellaneous spaces.

Shops, shower rooms and kitchen were not air conditioned.

The capacity of the 150-ton centrifugal refrigeration machine was selected for the classroom areas, Little Theater, activity center and some miscellaneous spaces.

Provision was made to transfer the chilled water from the classroom wing to arena whenever cooling is required for special activities.

CONTRACT & UNIT COSTS:

	COST	PER SQ. FT.
*General Contract	$ 911,368.60	$ 8.10
**Plumbing, Heating and Air Conditioning Contract	264,508.00	2.35
Electric Contract	110,870.00	.98
Kitchen Equipment	40,153.35	.36
Total	$1,326,899.95	$11.79

Gross Area, 112,472 sq. ft. — Total Cost, $11.79 per sq. ft.

*General Contract includes $160,000.00 for furniture.

**A breakdown of the Plumbing, Heating & Air Conditioning Costs —bid under a single contract—shows that the Heating & Air Conditioning System will be completely installed for $179,098.00 (itemized below) or $1.60 per square foot.

Sheet Metal Installed	$ 33,021.00
Temperature Controls Installed	22,779.00
Insulation Installed	8,158.00
Piping, Rough Materials	10,935.00
Heating & Air Conditioning Equipment	85,022.00
Labor	15,235.00
Miscellaneous: Bond, License, etc.	3,948.00
Total Heating & Air Conditioning	$179,098.00

Heating, Ventilating and Air Conditioning, $1.60 per sq. ft.

ESTIMATED OPERATING COSTS

	9-MONTH OPERATION	12-MONTH OPERATION
Fuel	$ 980.00	$ 980.00
Heating Auxiliaries	1,017.00	1,017.00
Cooling	749.00	1,369.00
Maintenance	2,850.00	3,350.00
Total	$5,596.00	$6,716.00

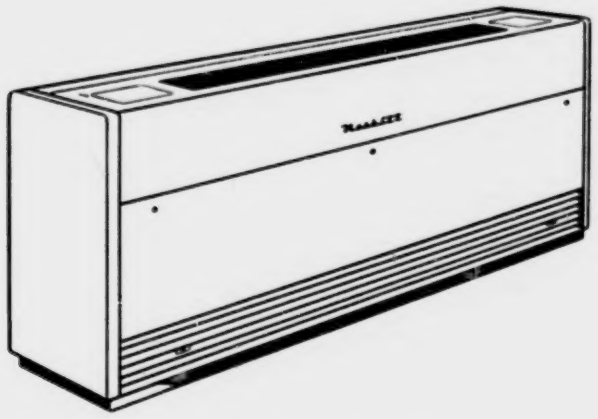
Gas at 30¢/MCF—Electric - 1¢ Energy, No Demand

Architect's Analysis of Savings:

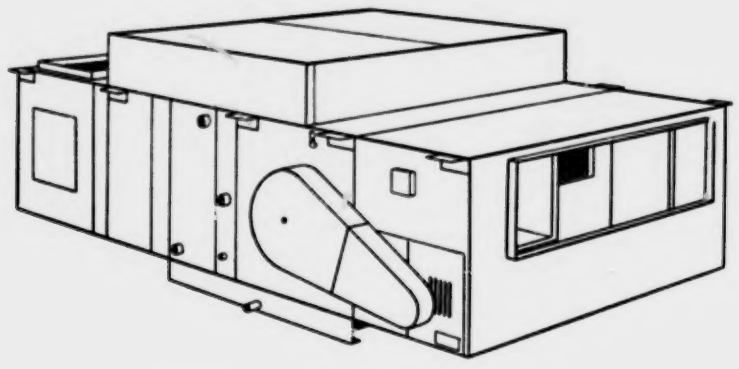
ITEM	McPHERSON SCHOOL with complete year-round air conditioning	CONVENTIONAL SCHOOL with partial air conditioning	SAVINGS	EXTRAS
1. Exterior Masonry Walls	$ 30,326.00	$ 97,901.00	$ 67,575.00	
2. Exterior Concrete Foundation Walls & Footings	55,796.00	123,285.00	67,489.00	
3. Pipe Tunnels	3,096.00	18,105.00	15,009.00	
4. Windows	8,500.00	38,100.00	29,600.00	
5. Glass and Glazing	11,600.00	31,760.00	20,160.00	
6. Miscellaneous Savings (Simplicity of Design, Repetition of Elements, etc.)			2,877.00	
7. Heating and Air Conditioning	179,098.00 (Complete Year-Round air conditioning system)	236,458.00 (Only administrative area is air conditioned)	57,360.00	
8. Roof and Wall Insulation	19,870.00	9,687.00		$10,183.00
9. Lighting Fixtures	29,500.00	22,100.00		7,400.00
		TOTAL SAVINGS	260,070.00	
		TOTAL EXTRAS	17,583.00	$17,583.00
		NET SAVINGS	$242,487.00	

(The above figures for both McPherson and the Conventional School were supplied by the contractor on the basis of actual cost. The Conventional School is equipped with a standard heating and ventilating system except for the administrative area where 20 tons of air conditioning is installed.)

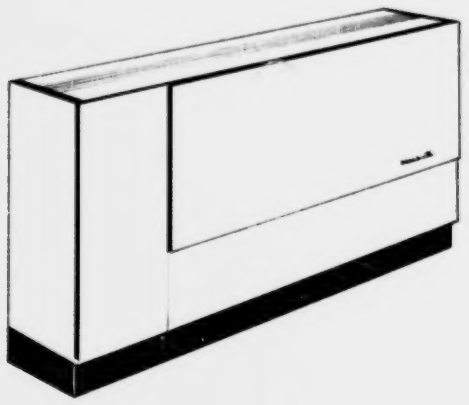
Nesbitt Air Conditioning Units Are Used in the McPherson School



Nesbitt Year-Round Syncretizers



Nesbitt AudiCon Air Conditioners



Nesbitt Roommate Air Conditioners